

2007 CMDC

Glewen and Kuzila

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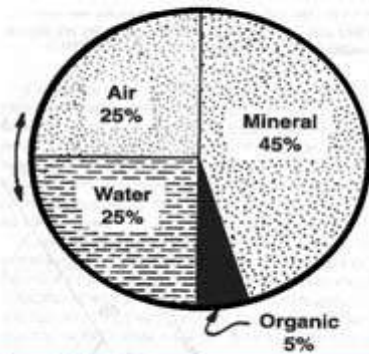
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MAJOR SOIL COMPONENTS



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QUASI SOIL PHYSICAL PROPERTIES - SOIL WATER

- **Infiltration – Movement of water into the soil.**
- **Percolation, permeability or hydraulic conductivity – Downward movement of water with the soil.**
- **Pore space is the conduit that allows water to infiltrate and percolate**

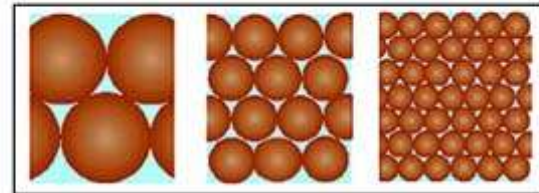
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QUASI SOIL PHYSICAL PROPERTIES - SOIL WATER

- **Medium textured soils (Fine sandy loam, silt loam and silty clay loam) (2.00 – 2.50 in/ft)**
- **Course textured soils (sand, loamy sands, and sandy loam) (0.25- 0.75 in/ft)**
- **Fine textured soils – held tightly (Clay (1.20 – 1.50 in/ft))**

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Factors Controlling Water Flow



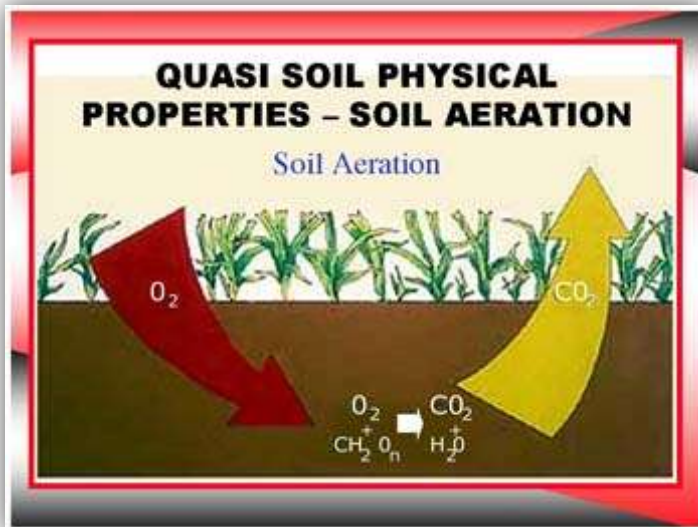
Coarser soils:

- Large pores hold water less tightly
- Faster water movement
- Less surface area (sorption)

Finer soils:

- Small pores hold water more tightly
- Slower water movement
- More surface area (sorption)

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SOIL COLOR

Soil Color

- Easily identified property.
- Used to relate chemical/physical properties such as watertable depth, drainage, chemical constituents, formation, horizons.

A photograph of a soil profile with a vertical ruler on the right side. The ruler is marked in centimeters, showing depths of 5, 10, 15, and 20 cm. The soil shows distinct horizons with varying colors and textures, from dark brown at the top to lighter, more granular layers below.

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SOIL COLOR

Color Description Example

- 2Br2—40 to 65 centimeters; yellowish brown (10YR 5/6) loamy sand; common medium and coarse distinct yellowish brown (10YR 5/8) moist irregular redox concentrations throughout, common medium prominent strong brown (7.5YR 5/8) moist irregular redox concentrations throughout, and common medium faint brownish-yellow (10YR 6/6) moist irregular redox concentrations throughout.
- 2Cg1—38.8 to 55.2 inches; olive gray (5Y 5/2) silt loam; common medium prominent strong brown (7.5YR 5/8), irregular redox concentrations throughout and common coarse prominent light olive brown (2.5Y 5/6), irregular redox concentrations throughout.

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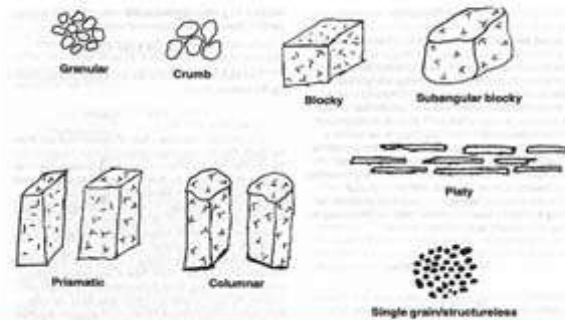
SOIL COLOR

Coloring Agents in Soil

- **Organic Matter (carbon):** Very strong coloring agent. Makes soil dark or black colored such as in an A horizon or topsoil.
- **Compounds and elements:** Such as iron, sulfur, manganese, etc. Iron is a dominant element in soils, when well aerated iron-oxides (rust) coat particles giving the soil a yellowish-brown to reddish color. Manganese oxides are purplish-black color.

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SOIL STRUCTURE



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Natural Processes that Aid in Forming Aggregates

- **Freezing and thawing**
- **Microbial activity that aids in the decay of organic matter**
- **Wetting and drying of the soil**
- **Activity of roots and soil animals**
- **Adsorbed cations**

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Importance of Soil Structure

- **Influence bulk density, porosity and pore size.**
- **Pores within an aggregate are quite small as compared to pores between aggregates and between single soil particles**
- **Balance of large and small pores provide good soil aeration, permeability and water- holding capacity.**

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BULK DENSITY – POROSITY – PORE SIZE

- **Bulk Density – dry weight of soil per unit volume of soil. (g/cm³)**
- **Porosity – volume of soil voids which can be filled by water and/or air**
- **Pore Size - Aeration is needed for the exchange of oxygen from the atmosphere and carbon dioxide given off by plant roots and microorganisms**

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QUASI SOIL PHYSICAL PROPERTIES - TEMPERATURE

- **Impacts chemical & biological reactions**
- **Time lag**
- **Water content affects temp change - > heat to warm wet soil than dry - evaporation.**
- **Sunlight**
- **Frost**
- **Color - Slope - Vegetative cover**

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